Canadian Centre for Occupational Health and Safety

Centre canadien d'hygiène et de sécurité au travail

OCCUPATIONAL DEAFNESS - DISEASE OR WORKPLACE PROBLEM THE WAY FORWARD

A Workshop

P88-26E

OCCUPATIONAL DEAFNESS - DISEASE OR WORKPLACE PROBLEM? THE WAY FORWARD

A Workshop

Hamilton, Ontario

October 13 and 14, 1988

Canadian Centre for Occupational Health and Safety

CCOHS/CCHST

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OCCUPATIONAL DEAFNESS - DISEASE OR WORKPLACE PROBLEM? THE WAY FORWARD

A WORKSHOP

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The Canadian Centre
for Occupational Health and Safety
A Workshop

OCCUPATIONAL DEAFNESS – DISEASE OR WORKPLACE PROBLEM? THE WAY FORWARD

Thursday, October 13 and Friday, October 14, 1988
Holiday Inn Hamilton, Hamilton, Ontario

Thursday, October 13, 1988

8:30 am — REGISTRATION AND COFFEE

9:00 am — Welcome and Introduction to the Workshop – Pavilion B

9:15 am — **Panel Discussion**, Moderator – Lillian Vine
Canadian Centre for Occupational Health and Safety

Social Consequences of Hearing Loss
Dr Raymond Hétu
Professor, Speach & Hearing Therapy
University of Montreal

Workplace Consequences – One Union's Views
Normand Nault
Officer, Workplace Injuries
Carpenters/Joiners Union (QFL)
Local 9

Workplace Design & Preventive Measures
Donald B Smith
Senior Engineer, Internal Environmental Engineer
Ford World Headquarters

Training — Pat Brogan
Industrial Hygiene Associate
Ford Motor Company

Open Discussion

10:30 am — BREAK

10:45 am **Workshop #1 – Scope of the Problem and Pre-Selection**

(a) What is the scope of the occupational deafness problem? How do people cope with the problem?
(b) How predictive are hearing tests? How scientifically valid?
(d) Can pre-selection tests be used to avoid or minimize occupational deafness?
(e) Does it lead to adaptive or discriminatory measures?

12 noon LUNCH - Pavilion C

1:30 pm **Workshop #2 – The Role of Audiometry**

(a) What is the place of audiometry?
(b) How should the results be used?
(c) Does it offer solutions? Does it create problems?

2:45 pm BREAK

3:00 pm **Workshop #3 – Job Design, Workplace Design and Preventive Measures**

(a) What are current strategies to reduce the risk of occupational deafness?
(b) Which work and which do not?
(c) How can you change the job?
(d) What engineering controls are available? Which can be put in place?
(e) What preventive measures are available? How widely are they used? Why are they not used more often?
(f) What is the role and quality of hearing protectors?

3:45 pm **Workshop #4 – Training**

(a) What is the role of training in eliminating or reducing occupational deafness?
(b) What kind of training?
(c) Who should deliver the training?

4:30 pm **Workshop #5 – Evaluation**

(a) How good are noise abatement programs in industry?
(b) How do different companies carry out evaluation of their programs?
(c) How successfully are statistics compiled? To what end?

5:30 pm	CASH BAR
6:15 pm	DINNER

Friday, October 14, 1988

9:00 am	**Workshop #5 – The Way Forward (Homogeneous Groups)**
10:30 am	BREAK
10:45 am	**Plenary Reports**
	Recommendations and Directions for the Future
12 noon	**Close of Workshop**

SUMMARY

On October 13 and 14, 1988, the Centre held a workshop on "Occupational Deafness - Disease or Workplace Problem? The Way Forward" in Hamilton, Ontario.

Participants tackled several issues: pre-selection, audiometry, job and workplace design as preventive measures, training, and evaluation. A panel discussion featured Dr Raymond Hétu, of the University of Montreal speaking on "Social Consequences of Hearing Loss"; Normand Nault, representing the Quebec Federation of Labour (QFL) speaking on "Workplace Consequences - One Union's View"; Donald Smith of Ford World Headquarters speaking on "Workplace Design and Preventive Measures"; and Pat Brogan of Ford Motor Company speaking on "Training."

A closing plenary session produced agreement on the following:

- Occupational hearing loss is a widespread problem and likely grossly underreported. One of the reasons for the underreporting is the social stigma attached to hearing loss; people are reluctant to admit to suffer from it.

- Engineered control of noise at source is the best way to prevent occupational hearing loss. It need not be exorbitantly expensive. Engineered controls should be the outcome of joint management-labour consultation. Personal protective equipment is a noise-exposure control of last resort.

- Audiometry does not control noise exposure nor does it prevent occupational hearing loss; if used, it should be part of a larger hearing conservation program.

- Laws governing occupational noise exposure should be realistic, enforceable, and enforced.

Participants directed CCOHS to recommend to education authorities across the country that occupational health and safety information be integrated into the curricula of elementary and secondary schools.

INTRODUCTION

Lillian Vine

Ladies and gentlemen, welcome. I'm Lillian Vine, Manager of Committees and Workshops at the Canadian Centre for Occupational Health and Safety. I would like to call on the President and Chief Executive Officer of the Centre to welcome you and introduce the workshop.

Gordon Atherley

Good morning ladies and gentlemen. I am Gordon Atherley, the President and Chief Executive Officer of the Centre. The Centre is funded by the federal government. A tiny fraction of the tax which you pay the federal government comes flowing back to Hamilton to the Centre. However, what the Centre does is decided, not by the federal government, but by a tripartite governing Council on which sit Governors from organized labour, from employers and from the governments across Canada. What we have found over the 9 to 10 years of our life is that a tripartite body functions through consensus--establishing a common ground. At times they acknowledge that there may be ground that isn't common; but they are often surprised at how broad the common ground and the consensus is.

That consensus is the foundation of the workshop process, because you will discover that there is considerable common ground between you. You will not necessarily agree on everything, but what you do agree on becomes very strong because you are all parties to it. For that reason these workshops are enthusiastically supported by our tripartite Council; they increasingly see the workshops as an important way in which the Centre can serve the occupational health and safety communities in Canada.

This is your workshop; the product is yours. You are working together on something which becomes your product to take away and use. The strength of the process is that you create the product.

I would like to say a special word of thanks to the panelists. Not only do we press them into being panelists but we also press them into various other duties during the day. We very much appreciate their role in this workshop, which is crucial to its success, and we hope that you and they will come together as a group so that the product represents a consensus on important issues.

Thank you very much for attending. Without you, the participants, the workshops are nothing. I hope you find this a worthwhile workshop. We will be interested to hear how you feel about the process after you have been through it.

PANEL DISCUSSION

Social Consequences of Hearing Loss

Workplace Consequences - One Union's View

Workplace Design & Preventive Measures

Training

CCOHS/CCHST

SOCIAL CONSEQEUNCES OF HEARING LOSS

Lillian Vine

Let me add my thanks to the panelists to Gordon's. They are not only on the panel now, they also met very, very early this morning.

To discuss the social consequences of occupational deafness is Raymond Hétu. Raymond Hétu obtained a Master's degree in experimental psychology in 1971 at the Université Laval in Quebec and completed graduate training in acoustics at the Université Louis Pasteur in Strasbourg, France. He was a research assistant at the Centre d'Etudes Bioclimatiques du Conseil National de Recherche Scientifique in Strasbourg between 1973 and 1975. He obtained his PhD in experimental psychology at the Université Laval in 1976. Since 1975, he has been teaching psychoacoustics, auditory physiology, industrial audiology and research methods at the School of Speech Therapy and Audiology at the University of Montreal since 1975, where he is a full professor. He also heads a research unit, the Acoustics Group of the University of Montreal, which is devoted to the study of the effects of occupational noise exposure. This group is financially supported by the IRSST (Institut de Recherche en Santé et Sécurité du Travail du Québec) since 1984. Raymond Hétu has been conducting research projects on the epidemiology of occupational hearing loss, on the effects of impulse noise on hearing, on extra-auditory effects of occupational noise, on the effect of exposure of the pregnant woman on the hearing of the fetus, and on the rehabilitation of workers suffering from occupational deafness. He has also written widely, not the least of which for "At The Centre," the Centre's bi-monthly newsletter. Raymond Hétu, it is a pleasure to introduce you.

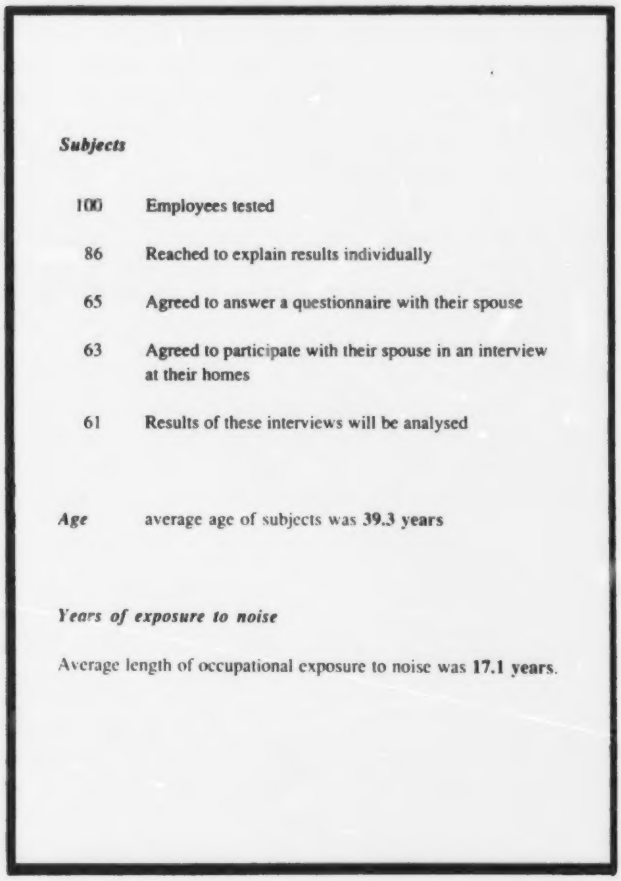
Raymond Hétu - University of Montreal

I will begin this session with a paradox. The fact that an occupation can cause hearing loss was scientifically established more than a century ago. Yet, occupational deafness is still, in 1988, the most frequent irreversible occupational disease. It is also the most frequent cause of hearing loss among male adults. It is the most expensive occupational disease in terms of compensation. In other words, we've known about the problem for a long time but very little has been done to effectively prevent it. Why is that?

There are many reasons. One is that the consequences of occupational hearing loss have been overlooked or are unknown to the people who should be concerned about it. Occupational hearing loss is not the problem of abnormal audiograms or compensation

costs. It is a matter of changing lifestyles--lives are very deeply changed. Using the results of a very recent study we have been conducting at the University of Montreal, I will try to convince you of that.

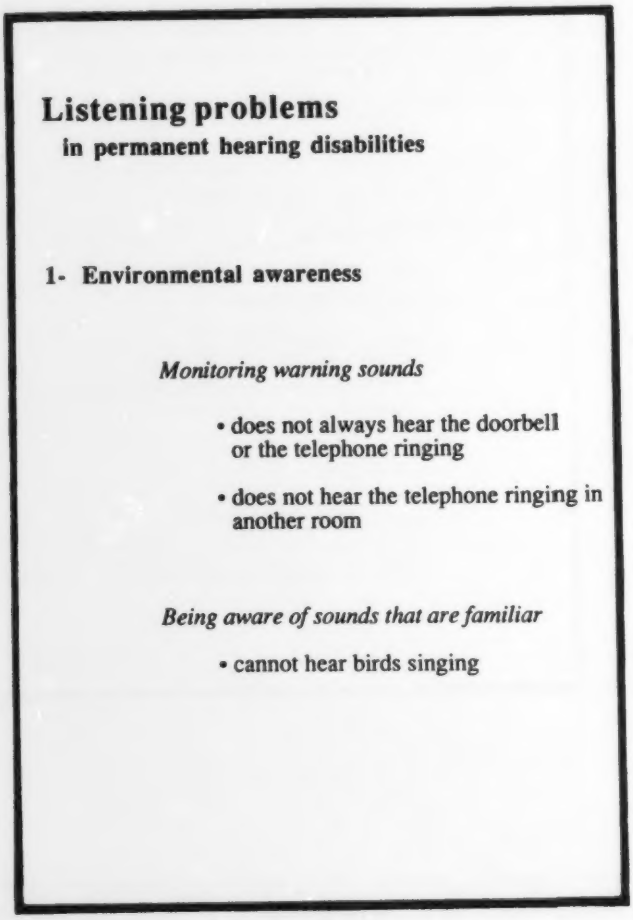
Figure 1


Subjects
100 Employees tested
86 Reached to explain results individually
65 Agreed to answer a questionnaire with their spouse
63 Agreed to participate with their spouse in an interview at their homes
61 Results of these interviews will be analysed
Age average age of subjects was **39.3 years**
Years of exposure to noise
Average length of occupational exposure to noise was **17.1 years**.

This study was done in a metal products plant where 100 workers are employed. All the workers underwent hearing tests and then they were asked to answer a questionnaire together with their spouses on hearing difficulties. Those who agreed to participate were asked to undergo a home interview with their spouse on hearing difficulties and the consequences of these difficulties in their lives. We met 61

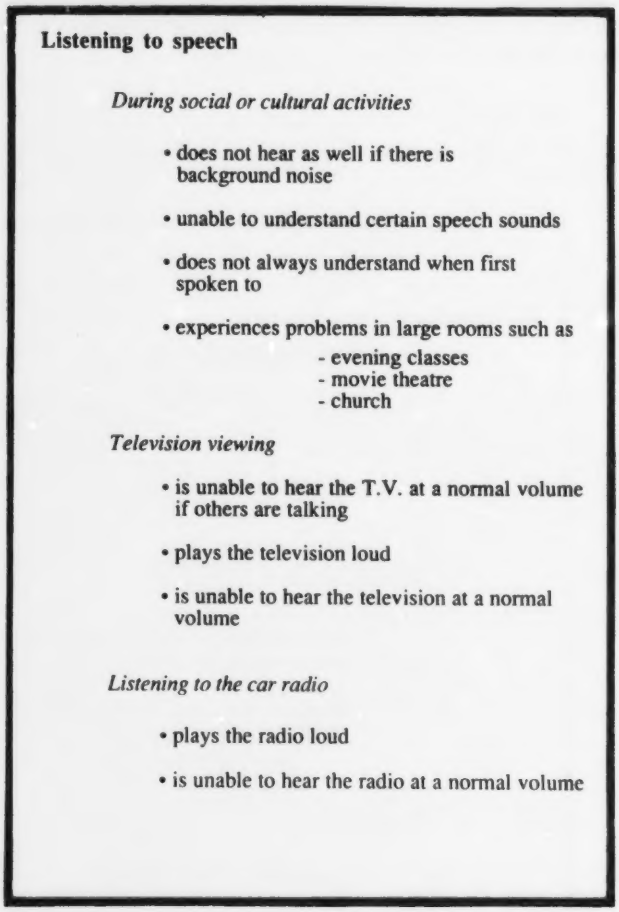
workers, half of whom had a hearing impairment due to noise and one-third of whom had a hearing loss severe enough to make them eligible for compensation. The interview was conducted at home and lasted up to 90 minutes; it was tape recorded and transcribed. This study was different from previous studies because we tried to describe the hearing difficulties of people using their own words--the way they experienced it. These are the problems they reported:

Figure 2


Listening problems
in permanent hearing disabilities
1- Environmental awareness
Monitoring warning sounds
• does not always hear the doorbell or the telephone ringing
• does not hear the telephone ringing in another room
Being aware of sounds that are familiar
• cannot hear birds singing

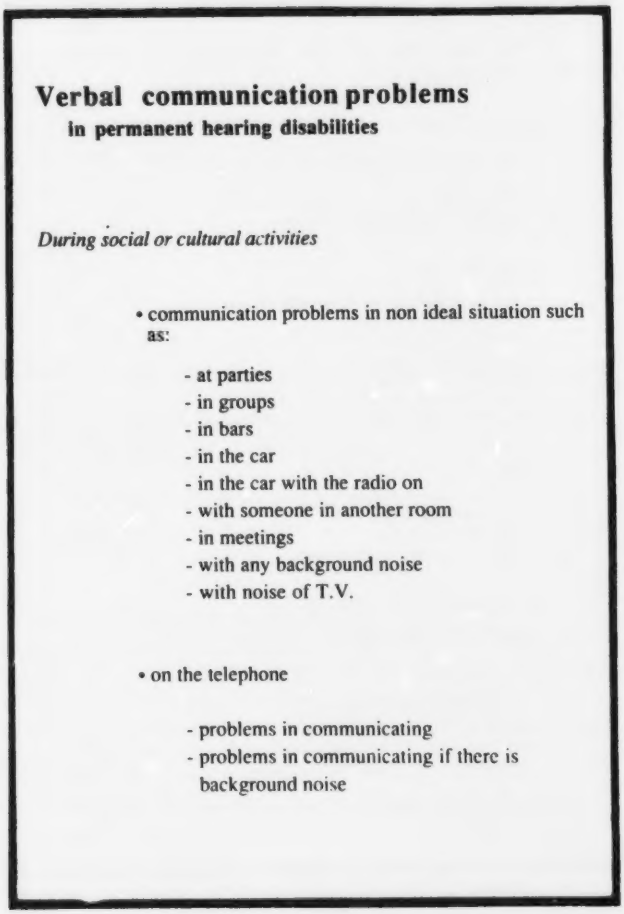
There are listening problems, of course. The employees would say they couldn't hear the doorbell or the telephone ringing in another room. It was expected that they would have problems monitoring the work environment in terms of warning signals or sound signals or just being aware of the sound environment in general.

Figure 3


Listening to speech
During social or cultural activities
• does not hear as well if there is background noise
• unable to understand certain speech sounds
• does not always understand when first spoken to
• experiences problems in large rooms such as
- evening classes
- movie theatre
- church
Television viewing
• is unable to hear the T.V. at a normal volume if others are talking
• plays the television loud
• is unable to hear the television at a normal volume
Listening to the car radio
• plays the radio loud
• is unable to hear the radio at a normal volume

There are listening problems with speech. They could not hear well when there were background noises, when they were in large groups or in large rooms. Most of them told us they had problems hearing the television at normal volume, so they had to adjust the volume. This represents a daily time-consuming activity for many of them, which implies a disability that is quite costly.

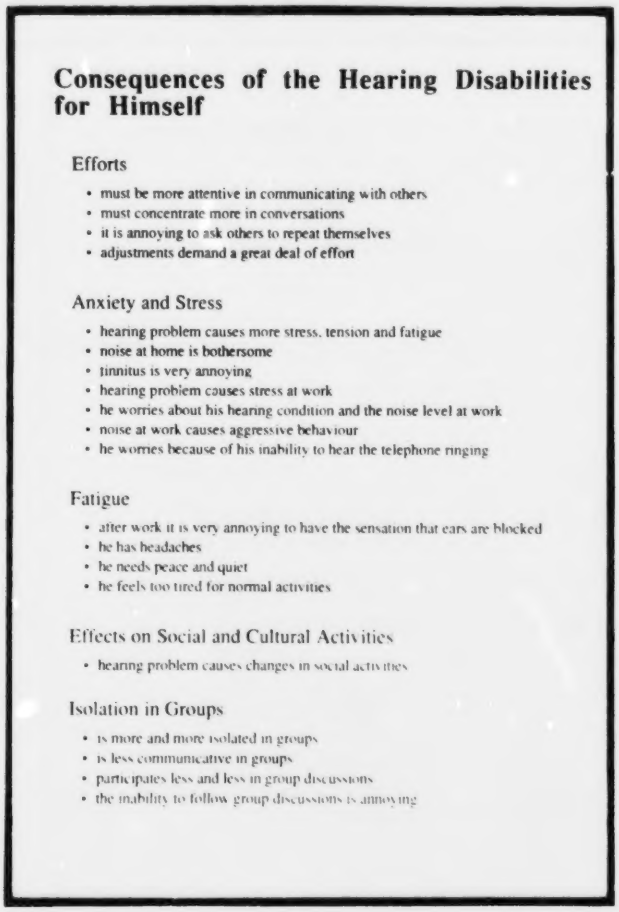
Figure 4


Verbal communication problems
in permanent hearing disabilities
During social or cultural activities
• communication problems in non ideal situation such as:
- at parties
- in groups
- in bars
- in the car
- in the car with the radio on
- with someone in another room
- in meetings
- with any background noise
- with noise of T.V.
• on the telephone
- problems in communicating
- problems in communicating if there is background noise

There are problems with communication, that is, interaction. They have a difficult time when they are involved in a one-to-one conversation in an environment with high background noise--such as at a party, in a group, in a bar, in a car, in a meeting.

A number of everyday life activities are affected. This was expected based on what we already knew about noise-induced hearing loss. More interesting are the consequences of these problems.

Figure 5


Consequences of the Hearing Disabilities for Himself
Efforts
• must be more attentive in communicating with others
• must concentrate more in conversations
• it is annoying to ask others to repeat themselves
• adjustments demand a great deal of effort
Anxiety and Stress
• hearing problem causes more stress, tension and fatigue
• noise at home is bothersome
• tinnitus is very annoying
• hearing problem causes stress at work
• he worries about his hearing condition and the noise level at work
• noise at work causes aggressive behaviour
• he worries because of his inability to hear the telephone ringing
Fatigue
• after work it is very annoying to have the sensation that ears are blocked
• he has headaches
• he needs peace and quiet
• he feels too tired for normal activities
Effects on Social and Cultural Activities
• hearing problem causes changes in social activities
Isolation in Groups
• is more and more isolated in groups
• is less communicative in groups
• participates less and less in group discussions
• the inability to follow group discussions is annoying

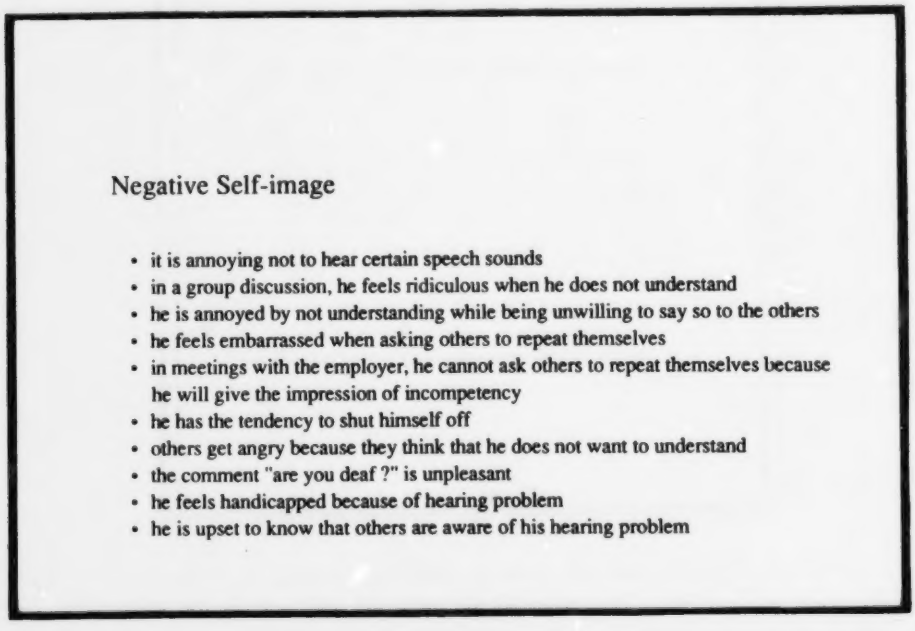
First, we can see there are consequences for the hearing impaired person. The first of these was effort in conversation--they had to make an effort to concentrate more, to lip read, or to ask people to repeat themselves.

The other problem that came up very frequently was anxiety and stress. Anxiety about what was going on with their ears and what was going to happen about their hearing loss. There was anxiety associated with tinnitus (ringing in the ears)--they were bothered and stressed by it and some were very worried about it. They were also worried about the inability to hear the telephone ringing. One person told us that when he was expecting a phone call, he would lift the receiver repeatedly to see if someone was calling. You can imagine how this would change a person's life and how others in the family would feel they could not rely on him/her to contact them by phone.

There are problems of fatigue. People feel they have more problems with hearing right after work; they have headaches and feel they have to be quiet for a while. They feel they are too tired to undertake or pursue normal activities for a time after work.

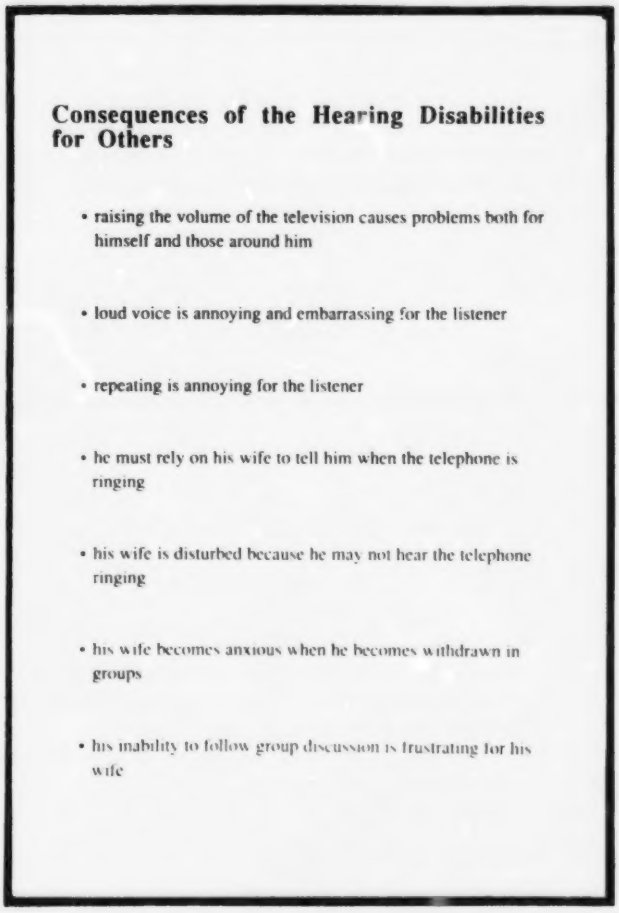
Another common consequence is that they tend to withdraw from social groups. A very salient consequence of hearing disabilities is that those affected isolate themselves when they are in a group conversation by getting behind or outside the context of the group, or by participating less and less. Actually they cannot follow the group conversation.

Figure 6


Negative Self-image
• it is annoying not to hear certain speech sounds
• in a group discussion, he feels ridiculous when he does not understand
• he is annoyed by not understanding while being unwilling to say so to the others
• he feels embarrassed when asking others to repeat themselves
• in meetings with the employer, he cannot ask others to repeat themselves because he will give the impression of incompetency
• he has the tendency to shut himself off
• others get angry because they think that he does not want to understand
• the comment "are you deaf ?" is unpleasant
• he feels handicapped because of hearing problem
• he is upset to know that others are aware of his hearing problem

All these problems plus the disability itself lead to another consequence or handicap. People perceive themselves as diminished, as a failure, their self-image is spoiled. They feel ridiculous for not understanding something or having to ask that something be repeated. They feel incompetent if they have to have things repeated in a meeting at work. This is very serious because these people tend to be depressed. They isolate themselves, they don't show their difficulties and they are depressed. This is a severe consequence of the disability.

Figure 7

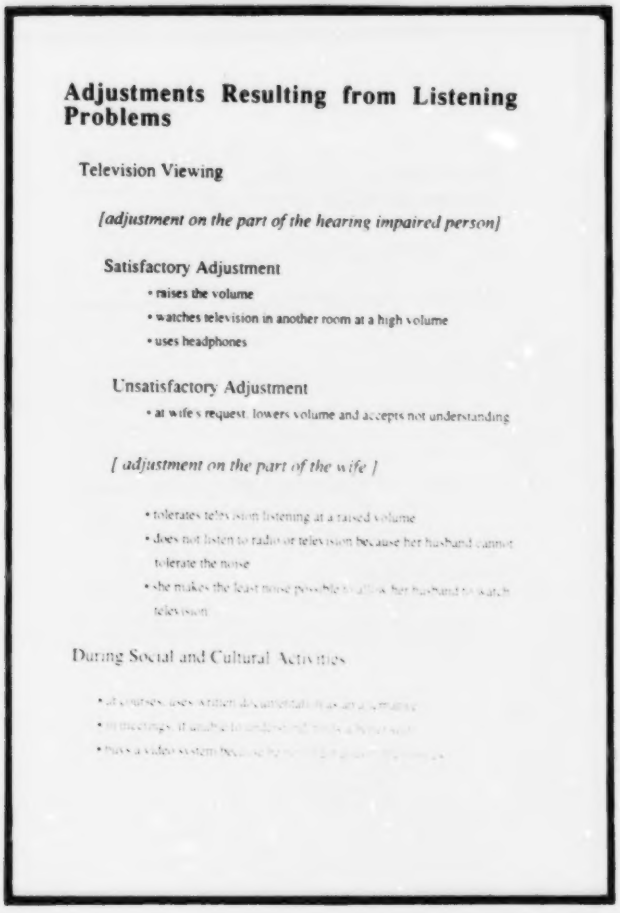

Consequences of the Hearing Disabilities for Others
• raising the volume of the television causes problems both for himself and those around him
• loud voice is annoying and embarrassing for the listener
• repeating is annoying for the listener
• he must rely on his wife to tell him when the telephone is ringing
• his wife is disturbed because he may not hear the telephone ringing
• his wife becomes anxious when he becomes withdrawn in groups
• his inability to follow group discussion is frustrating for his wife

The consequences also affect the people close to them, especially the family, because communication is interactive. Having to raise the volume on the television or using a loud voice when speaking is very annoying to the spouse. Commonly wives become the ears for their spouse, because they cannot pursue contact through the telephone or with people they don't know. This imposes a serious burden on the spouse.

The spouse is frustrated by being withheld from social gatherings. Not only are many activities affected, but the whole quality of life is changed. The self-image is damaged by this problem. Marital and family interaction are affected.

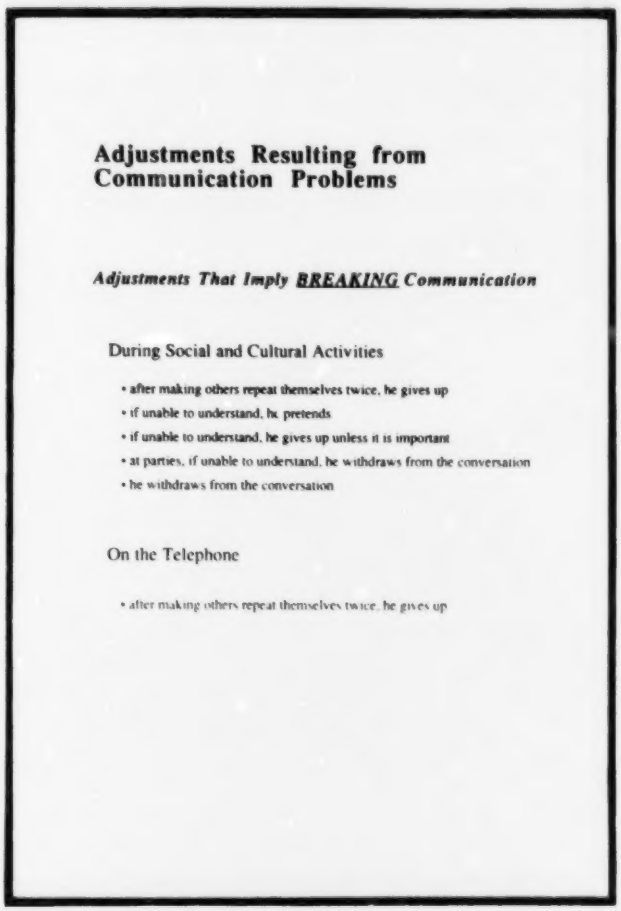
These problems call for spontaneous adjustment and reduction of the consequences of the disability.

Figure 8


Adjustments Resulting from Listening Problems
Television Viewing
[adjustment on the part of the hearing impaired person]
Satisfactory Adjustment
• raises the volume
• watches television in another room at a high volume
• uses headphones
Unsatisfactory Adjustment
• at wife's request, lowers volume and accepts not understanding
[adjustment on the part of the wife]
• tolerates television listening at a raised volume
• does not listen to radio or television because her husband cannot tolerate the noise
During Social and Cultural Activities

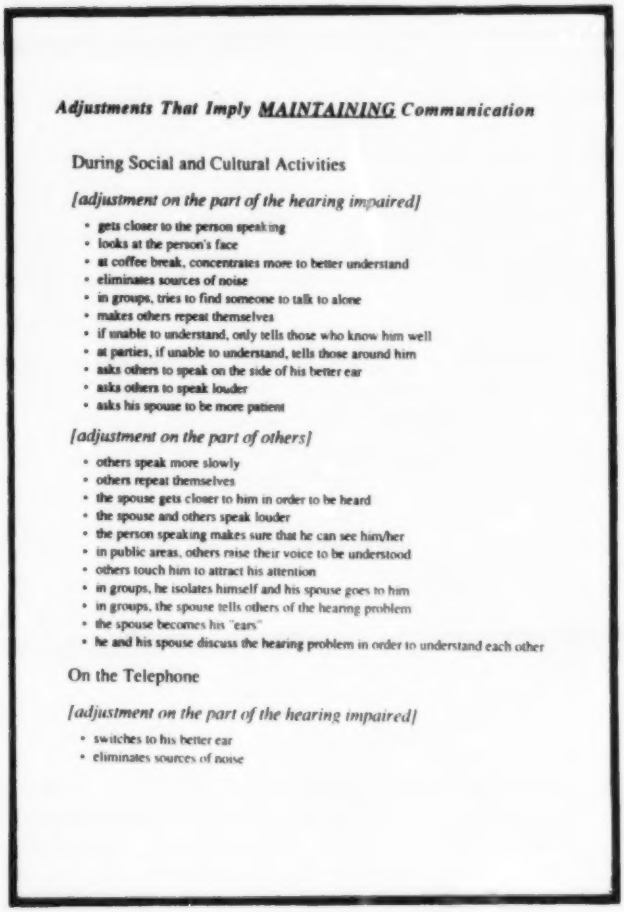
When viewing television, they would just raise the volume. We classify that as satisfactory for the hearing-impaired person, but unsatisfactory for the people around them. What is spontaneous adjustment appropriate for the hearing-impaired person can be costly or annoying for the people around them. The same holds true for other activities. They will use a video system instead of going to the theatre; while this is an adjustment it is not the same activity. It implies a cost.

Figure 9


Adjustments Resulting from Communication Problems
Adjustments That Imply BREAKING Communication
During Social and Cultural Activities
• after making others repeat themselves twice, he gives up
• if unable to understand, he pretends
• if unable to understand, he gives up unless it is important
• at parties, if unable to understand, he withdraws from the conversation
• he withdraws from the conversation
On the Telephone
• after making others repeat themselves twice, he gives up

There are adjustments resulting from the communication problems; many of these imply breaking the communication or withdrawing from conversation. Very clearly, when they had to ask to have something repeated twice, they had reached a limit. They couldn't ask a third time. The solution to that is to let it go and try to guess or pretend that they understand. They give up. These adjustments further affect their self-image.

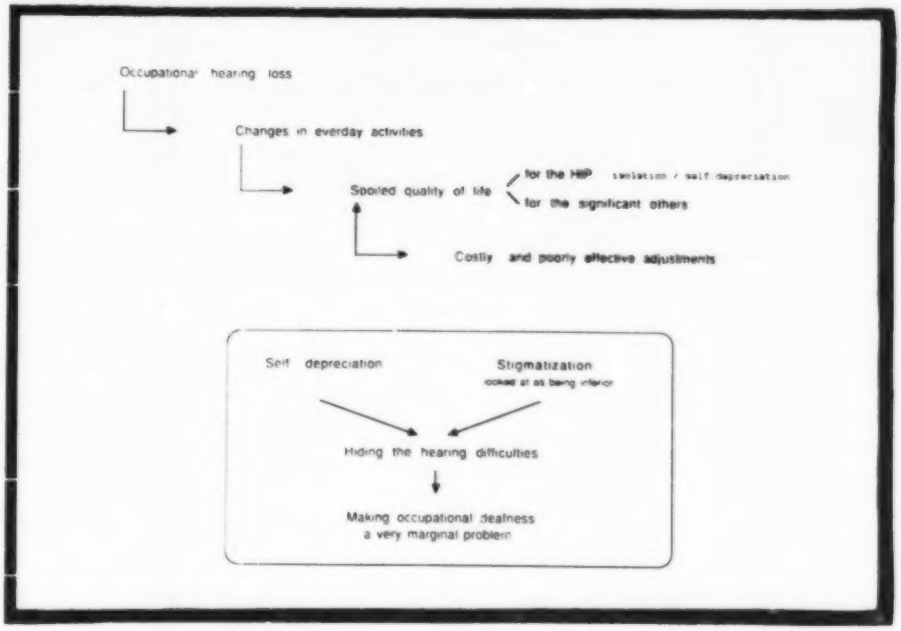
Figure 10


Adjustments That Imply MAINTAINING Communication
During Social and Cultural Activities
[adjustment on the part of the hearing impaired]
• gets closer to the person speaking
• looks at the person's face
• at coffee break, concentrates more to better understand
• eliminates sources of noise
• in groups, tries to find someone to talk to alone
• makes others repeat themselves
• if unable to understand, only tells those who know him well
• at parties, if unable to understand, tells those around him
• asks others to speak on the side of his better ear
• asks others to speak louder
• asks his spouse to be more patient
[adjustment on the part of others]
• others speak more slowly
• others repeat themselves
• the spouse gets closer to him in order to be heard
• the spouse and others speak louder
• the person speaking makes sure that he can see him/her
• in public areas, others raise their voice to be understood
• others touch him to attract his attention
• in groups, he isolates himself and his spouse goes to him
• in groups, the spouse tells others of the hearing problem
• the spouse becomes his "ears"
• he and his spouse discuss the hearing problem in order to understand each other
On the Telephone
[adjustment on the part of the hearing impaired]
• switches to his better ear
• eliminates sources of noise

There are adjustments to maintain communication. Again, these imply efforts and costs. For instance, they make adjustments by getting closer to the person speaking, looking at the person's face, concentrating more to better understand, trying to find someone to talk to alone in a group, making people repeat themselves, and so on. All these solutions can work and can maintain communication but at some cost.

Since communication is interactive, adjustment is required from the other party. Speaking more slowly is acceptable for a few seconds, but after a couple of hours it becomes tedious. Repeating often is also an effort. Becoming the ears or the interpreter for the hearing-impaired person is a serious burden. So the handicap is shared and the costs are shared. The adjustments are further handicapping in the sense that they induce other costs or disadvantages.

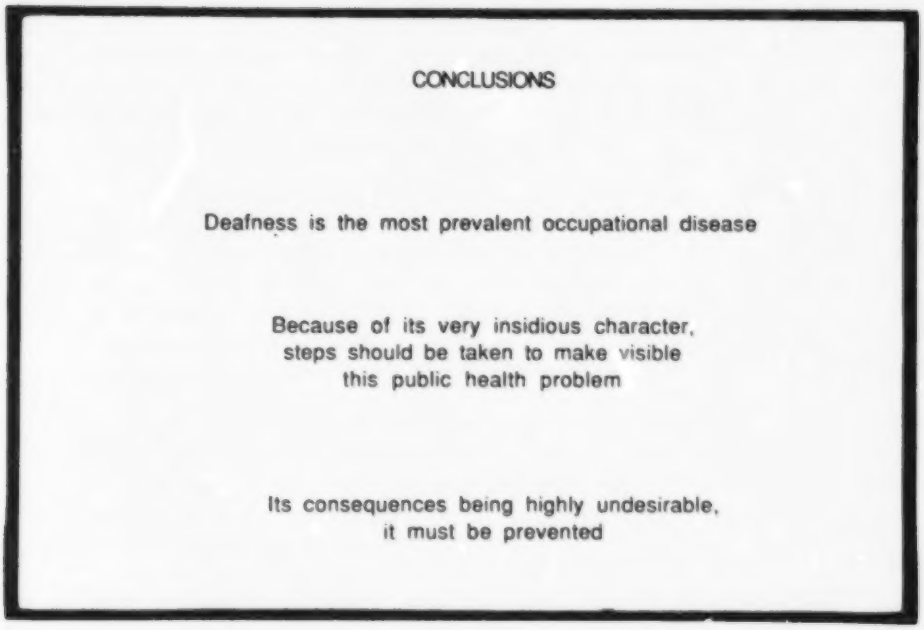
Figure 11



Occupational hearing impairment affects many everyday activities. This implies very serious disadvantages in the quality of life of the hearing-impaired person in terms of isolation and self-depreciation, but also to the significant others. The adjustments are in themselves causes of disadvantages, and they are not very effective. Because of self-depreciation and of trying to hide their difficulties, these people do not look for other means to adjust, such as using hearing aids or technical aids. They do not seek professional help and they withdraw.

The very consequence of the question I asked originally was that self-depreciation is added to the stigmatization of hearing impairment in the workplace. People who are somewhat hearing impaired are labelled with being dumb or old. So these people will not admit their disability, and the problem is not visible. Many who have the problem hide it.

Figure 12


CONCLUSIONS
Deafness is the most prevalent occupational disease
Because of its very insidious character,
steps should be taken to make visible
this public health problem
Its consequences being highly undesirable,
it must be prevented

Conclusions--this is the most prevalent irreversible occupational disease because of its insidious character; it should be made visible and it should be made visible as a very serious public health problem. And, of course, it must be prevented.

WORKPLACE CONSEQUENCES - ONE UNION'S VIEW

Lillian Vine

All the presentations and the plenary closing session are recorded and published in the proceedings. The sessions in mixed groups and in homogeneous groups to look at the issues, to find the common ground and to determine a way forward will not be recorded; only the conclusions of those discussions will be printed.

The workshops begin with a request. In this case, the requester was Serge Trudel of the United Steelworkers of America. Several weeks after we started to think about it, he became a Governor of the Centre. Some months after that he was seconded to the Quebec Federation of Labour in Montreal, Quebec. He worked with us on the planning of this workshop, then found that he had a conflict in dates and could not be here. His new job demanded that he be in Turkey. He found a very able replacement, Normand Nault, who is here on behalf of the Quebec Labour Federation.

Normand Nault is a union representative in charge of occupational health and safety at the United Brotherhood of Carpenters and Joiners of America. His work experience and occupational health and safety activities are as follows.

He worked as an assembler in the Ste. Thérèse General Motors plant for 15 years. During this period he held the union position of occupational health and safety representative. He was active in the Quebec Federation of Labour and was a member of the QFL's occupational health and safety committee. He gave several courses on occupational health and safety and wrote up such courses, one on work accidents and compensation, and one on the appeal process and accident investigation.

He will be speaking on the consequences of noise in the workplace, whereas Raymond Hétu spoke on the consequences outside of work. Mr. Nault represents the Quebec Federation of Labour. Normand, it gives me great pleasure to turn the floor over to you.

Normand Nault - Quebec Federation of Labour

I agreed to speak to you on behalf of the Quebec Federation of Labour for the benefit of the discussions which will take place during this workshop organized by the Canadian Centre for Occupational Health and Safety.

We must reduce noise in our workplaces because of the serious consequences it has on those who are exposed to it. And reducing noise does not mean reinventing the wheel. All, or almost all, the solutions already exist. There is very good documentation available to help occupational health and safety committees reduce noise.

For example, I would strongly advise you to read a Swedish booklet entitled "Noise Control" which was translated first into English and then into French.

The consequences of noise in the workplace--I will begin by speaking on the psychological effect. It is not necessarily the intensity of the noise but rather the noise itself which is irritating and tiresome. Let's say it is night and you are at home resting, and the tap is dripping. The dripping is not intense, but it is tiresome and annoying. Noise is unpleasant and annoying; it affects our mood.

I can speak as a worker. When a workplace is terribly noisy, the worker has no great desire to get up and go to work in the morning. When everyone is talking about programs on the quality of life at work, I think we should realize that the quality of life at work begins by reducing noise at the source.

Noise is dangerous. Dangerous because it increases the risk of accidents occurring--all the studies have proved this. Noise covers sounds. If you are working on a press and a new sound appears which ought to alert you to a danger, there is a good chance that you will not hear the new sound. Noise causes a risk of injury.

Noise can make someone go deaf. This is no laughing matter; it is serious business when someone loses a sense necessary for living. A sense which allows us to hear dangers behind us is important; it would be a good idea to keep it intact.

Deafness begins by a temporary hearing loss each day. Here is a good example: you leave your noisy workplace, get into your car, adjust the volume of the radio, then stop the car; when you get into your car the next morning to come in to work and start the car, the radio starts, and what happens? You jump, and ask yourself what idiot turned the radio on so loud--it was you the day before.

After a long period of exposure--ten, fifteen, twenty years--you suffer from permanent, irreversible hearing loss. You are finished, permanently affected, deaf.

Noise is a stress agent. Our bodies react to noise because they have defense mechanisms to protect us. Let's take an example: you are walking quietly in the woods. Suddenly, someone fires a gun. In the first few seconds following the shot, your body will react; there will be an increased cardiac rate and breathing rate, and your blood pressure will rise to prepare your muscles for action. You are on the alert, on the defensive. This is what we call a violent reaction.

Exposure to noise in the workplace also causes a reaction; although it is not quite as violent, this reaction occurs constantly. It increases the heart rate and causes hypertension; our stomach has trouble functioning because the blood has been diverted to increase the heart rate. After a long period of time, the victim will have digestive problems and heart problems, and that will contribute to premature aging. And when we talk about noise, we should never forget that this only adds to the other constraints already present in the workplace, such as toxic products, heat, the pace of work--and they all add up.

Many studies have been conducted on the consequences of noise. One of these consequences is that people exposed to noise suffer from hypertension. Researchers have found increased cholesterol levels in metalworkers exposed to noise levels of 88 to 112 dBA.

As Raymond has said, the effects of noise follow us home. The worker may leave the workplace, but the effects of the workplace do not necessarily disappear automatically. Noise follows us, even two hours later: we become sullen, irritated, tired, stressed, and our wives or husbands and our children are made to suffer these unpleasant effects.

My role at the Brotherhood is to make sure people are compensated when they suffer work accidents or occupational illnesses.

Last Monday, I was in my office when a 61-year-old worker arrived. He has been receiving unemployment insurance for ten months. Both of his ears have been affected, so he wears hearing aids. He said to me, "Normand, I am not going back to working in construction." I said, "Why not? You have the right to keep working in construction." He said, "But I'm deaf." "So?" I asked. He replied, "Being deaf in the construction industry means two things. First: I can't hear what they ask me to do anymore. So I do things differently from what they asked. And my co-workers laugh at me. Second: it's dangerous. I can't hear anything anymore. There is a danger of accidents. I want to retire." If he does not take early retirement, he will have to live on welfare in two months--all because of noise. This is an enormous financial problem for someone who has earned his living honestly all his life. Unfortunately for him, he is deaf.

Reducing noise is always possible. In 1974, an American study commissioned by OSHA found that it was possible to reduce the noise to less than 85 dBA in 92% of workplaces.

Imagine what could be done now, 14 years later, with all the technological advances. In 1960 men were able to go to the moon. A few years later they went again, and now trips to the moon are a matter of course. Solutions to noise exist. But we must be willing to use them in our workplaces to solve the noise problem.

First of all, noise can be controlled at the source, that is, directly on the machine; by changing work methods which could be much less noisy; by reducing the noise of the motors, which can be done simply by changing the gearing; sometimes by installing the motors on the roof in an enclosure. And, of course, by regular, methodical upkeep: oiling and lubricating equipment that needs it.

Second, the propagation of noise can be controlled. Sound waves can be transmitted to the ear in four different ways: 1) directly from the source to the ear; 2) by reverberation--off the walls and ceilings; 3) through partitions (noise coming from another workshop); and 4) they can also be transmitted from the floor, particularly low-frequency sound waves.

Several methods exist to correct these situations. There are enclosures. Many of you, no doubt, have been to a garage to have your car repaired. Is there anything more annoying than hearing the compressor start up every ten or fifteen minutes? This compressor could easily be put in an enclosure.

There are also vibration-reducing treatments. By placing absorbent material between the source of noise and the contacting joints of the floor or wall, reverberation can be prevented.

Mufflers. Imagine Yonge Street in Toronto if none of the cars had mufflers. It would be dreadful. Mufflers have been around for a long time, but in many workplaces they are not installed or used.

Soundproofing the rooms and building sound booths are other possibilities. Remember jackhammers, power hammers? Today it is quite common to see someone in a cab who not only is not affected by the vibration, but no longer hears the noise and controls the power hammer on the tractor.

For two or three years now there has been an effective new device available to identify the source of noise and determine its cause: the intensity meter. And of course the noise meter to identify the noise level. But the intensity meter is more accurate and identifies exactly where the source of the problem is in your workplace. Thus, instead of changing the gearing four or five times it may be necessary to change it only once.

Of course, there are costs involved. But what I found especially wearisome and ironic when I was a health and safety representative is that often when I mentioned the noise problem I was told, "We'll study the matter." The problem was put off for six, seven, eight months or a year. Implementing a solution then involved considerable cost in relation to the cost that would have resulted had we used solutions which existed at the time the problem arose.

The container industry is a typical example in Quebec right now. Concerted action was taken here by the employer, the union, the CSST, and the sectorial association of manufacturers of metal products and electrical devices. They took charge and the sectorial association offered its expertise to help identify the noise problem more accurately. Once the problems were identified, they published an invitation to tender to obtain the most appropriate solutions. This produced results, very good results. There is nothing new in using solutions based on common principles, but it emphasizes the fact that an organized, joint approach makes the difference between doing nothing and finding and implementing solutions.

WORKPLACE DESIGN & PREVENTIVE MEASURES

Lillian Vine

Thank you very much, Normand. Normand and Raymond have shown us that a disease does not have to be fatal to seriously impair the quality of life, not only of the affected person but also of the significant others.

To talk about workplace design and preventive measures is Donald Smith. Donald Smith is a Senior Internal Environmental Engineer at the Ford World Headquarters. Don was not with us during the teleconference planning meeting; but we have found another advantage that comes from the workshops is networking. One person we call on is Bruce Waechter, who is Manager, Labour Relations Planning at Ford in Oakville and has wider duties in Ford. I first met Bruce when we invited him to the dinner session of one of our Council of Governors' meetings in Hamilton. Since then, I have called on him many times. Bruce was involved in the teleconference and included Pat Brogan. Between them, they agreed that Don Smith would be a very good choice to talk about workplace design and preventive measures. Don was good enough to agree not only to speak on our panel but also to chair a work group.

Donald Smith is a Registered Professional Engineer in Wisconsin and a member of the Acoustical Society of America and the Institute of Noise Control Engineering. He has had wide experience, starting in 1955 when he was a Plant Noise Engineer for Western Electric Company; he then became a member of the Technical Staff at Bell Telephone Laboratories; a Senior Research Scientist at Owens-Corning Fiberglas; Manager, Acoustic Laboratory at Celotex Corporation; Technical Supervisor at B F Goodrich; Acoustic Project Consultant at Exxon Corporation; Senior Acoustical Consultant at Commonwealth Associates. He has been at Ford since 1976 as Senior Engineer of Plant Engineering Staff, Manufacturing Staff, Plant Engineering Office and then as Senior Engineer in Operations Support Services. It is my pleasure to call on Donald Smith.

Donald Smith - Ford Motor Company

The title of my portion of the workshop is rather interesting and all encompassing because it covers so much of what noise control is about. I will try to provide a basis on which to build a systematic approach to preventive noise control. To do this, we will review three basic physical terms used in noise measurement--decibel, frequency and dBA which is a regulatory number, not an engineering number.

The two basic terms we are working with are decibel and frequency. The decibel (dB) measures how much energy is generated by the source being measured. It is not a linear function; it's a logarithmic function because of the large amount of energy involved. Because it is logarithmic, it is difficult to deal with. For example, if you have ten machines operating at the same noise level and you stop five of these machines, you have reduced the energy by half, but that registers only 3 dB on the

log scale. The ear does not respond to that as a 3 dB reduction; the subjective reaction resulting from cutting off half the machines is that only a 20% reduction in noise level occurs. In fact, to reduce the sound by 50% as our ears perceive it, you would have to shut down eight machines out of ten. In engineering terms, a meaningful noise reduction should be 7 to 10 dB to have an observer say that it is much quieter. Therefore, the physical measurement of sound is not linear nor is how we perceive sound linear.

Frequency (or Hertz) is the second physical measurement that we need to understand to quiet a noise source. Sound frequency is similar to light frequency. If you put white light through a prism, it breaks up into various colours. Those are the different frequencies that go together to comprise white light. Sound, too, can be broken up by putting it through electronic filters to give its frequency content. Subjectively, we know frequency as low-pitch sound and high-pitch sound; a boat whistle is a very low sound and a jet engine is a very high sound.

Humans can hear from 20 Hertz to about 20 kiloHertz, but our hearing mechanism does not perceive all frequencies the same.

Figure 13

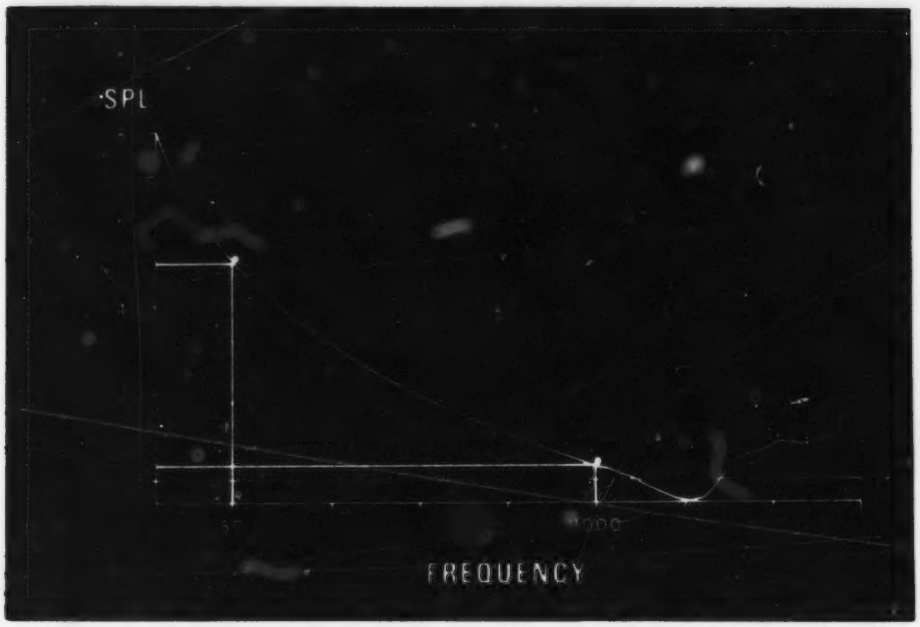
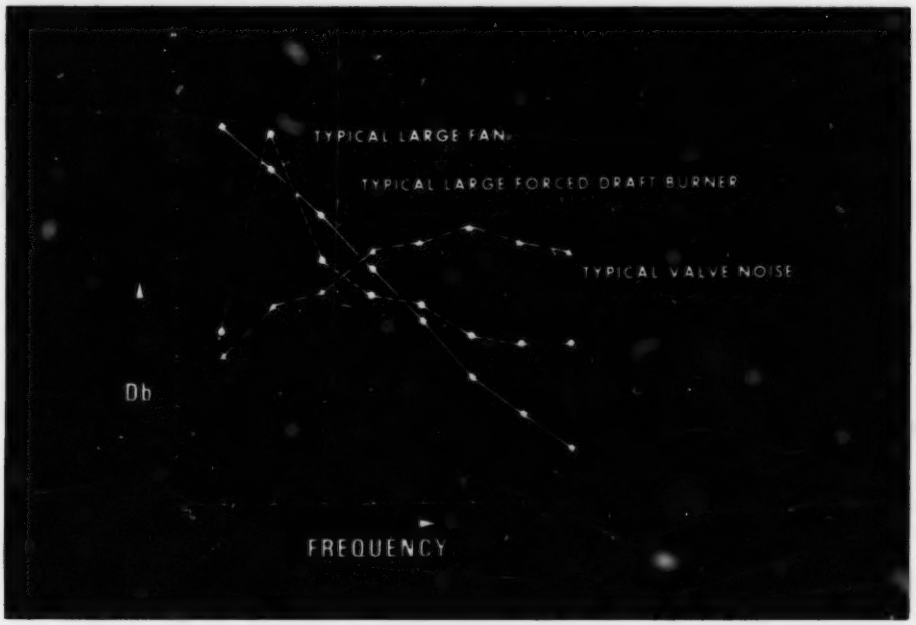


Figure 13 illustrates the Fletcher and Munson curve which was compiled in 1939 at the World's Fair in New York; it represents the average of thousands of people whose hearing was checked with frequency versus intensity. The graph shows that above the curve, one can hear the sound and below the curve, one cannot hear the sound. If you look at the bottom along the frequency scale, you see 50 Hertz which is a low frequency sound. If you follow that up to where it hits the curve and draw a line

to the scale, you can see that you would need 50 dB of energy to hear that 50 Hertz sound. Conversely, if you look along the frequency scale to 1,000 Hertz, you can see that only 1 dB of energy is required for a person to ascertain that a sound is occurring. This curve shows how the human ear responds to frequency; and it is not linear.

This non-linearity of human hearing results in the dBA devised by the US regulatory agency and the Canadian federal government. The dBA is simply a network built into a sound level meter which approximates how the human ear responds to low and high frequency sound. The dBA network takes into account the non-linearity of human hearing. The dBA measurement is regulatory; it is not an engineering measurement. To perform engineering functions, more than the dBA measurement is needed.

Figure 14

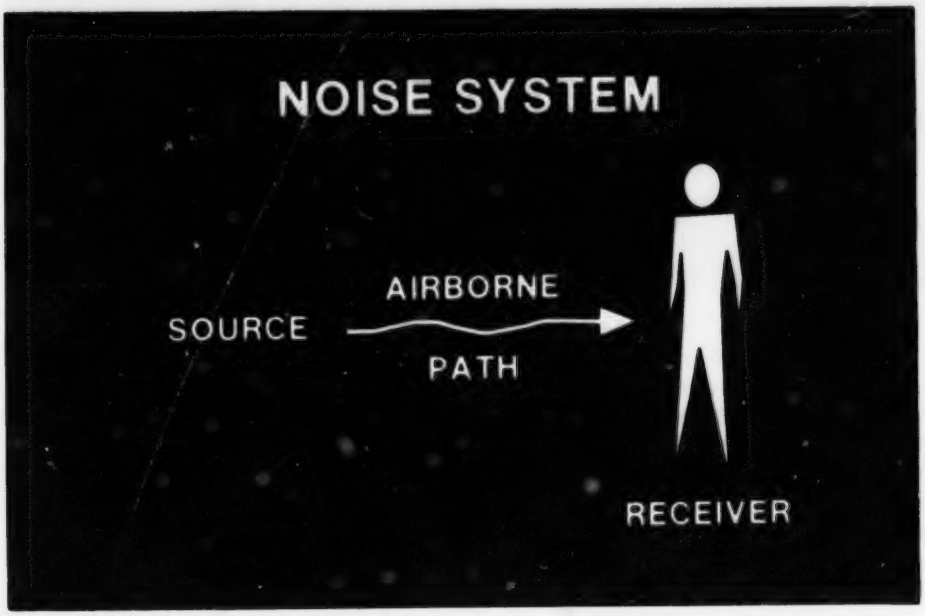


This graph shows a typical industrial noise situation with three different types of machinery--a fan, a forced draft burner and a valve noise. These curves are all about 90 dBA. You can see how radically different in shape they are. The typical fan has a peaked response in the very low end; the valve noise is concentrated in the high frequency area; the forced draft burner has a lot of low frequency energy. They are all equal to 90 dBA but this is of no value for engineering purposes. You

need to have a defining mechanism such as the frequency distribution that will enable you to analyze these noises and quiet them. For example, you can slow down the large fan or put a duct silencer on it or tune the fan so that it is balanced to reduce that very strong one band noise. Since they are different, the other sources would have to have different corrections to reduce their noise levels.

The next part of my presentation will cover the systematic approach to noise control.

Figure 15



As Figure 15 indicates, the noise system is very simple--you have a source, a path and a receiver. The airborne path is augmented by a structural or vibration path, which is not shown here.

Figure 16

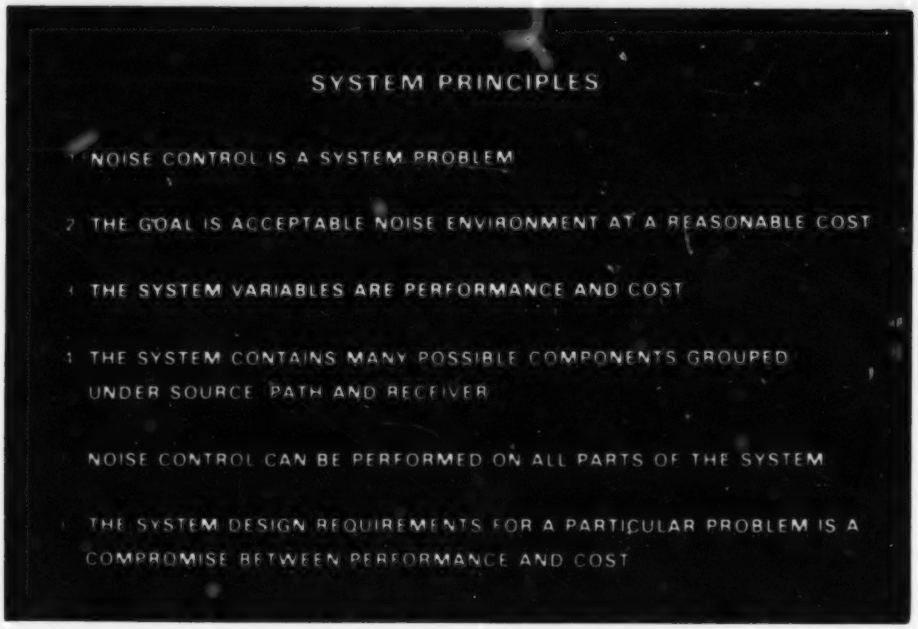

SYSTEM PRINCIPLES
NOISE CONTROL IS A SYSTEM PROBLEM
2 THE GOAL IS ACCEPTABLE NOISE ENVIRONMENT AT A REASONABLE COST
THE SYSTEM VARIABLES ARE PERFORMANCE AND COST
THE SYSTEM CONTAINS MANY POSSIBLE COMPONENTS GROUPED UNDER SOURCE PATH AND RECEIVER
NOISE CONTROL CAN BE PERFORMED ON ALL PARTS OF THE SYSTEM
THE SYSTEM DESIGN REQUIREMENTS FOR A PARTICULAR PROBLEM IS A COMPROMISE BETWEEN PERFORMANCE AND COST

Figure 16 shows the system principles. Noise control is a system problem. The goal is an acceptable noise environment at a reasonable cost. The system variables are performance and cost. The system contains many possible components grouped under source, path and receiver. Noise control can be performed on all parts of the system. And the system design requirements for a particular problem is a compromise between performance and cost. What you have to do is determine what a reasonable cost is. In some cases, the company will go along with a solution because it has a very low cost but in other cases, when you can get a significant noise reduction but it costs a lot of money, the solution isn't implemented.

Figure 17 shows a typical noise source--an air compressor--with the source, the path and the receiver. There are three sources of noise: the intake and exhaust noise, the casing noise, and the floor and pipe vibration. The noise path is reflected and direct, which means that the intake and exhaust noise can be reflected off the ceiling and can also go directly through the air to the operator. The same is true of the casing which is generally direct noise to the operator; but it can be reflected off the walls. Floor and pipe vibration is direct and indirect; in other words, this noise radiates into the floor which then becomes a secondary radiator, so that is an indirect addition to the operator's total sound level.

Figure 17

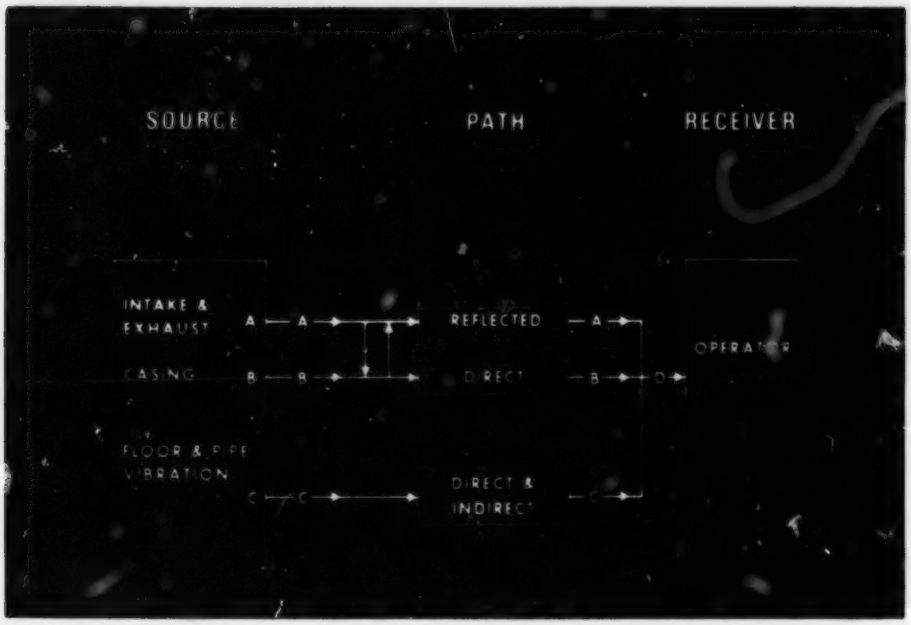


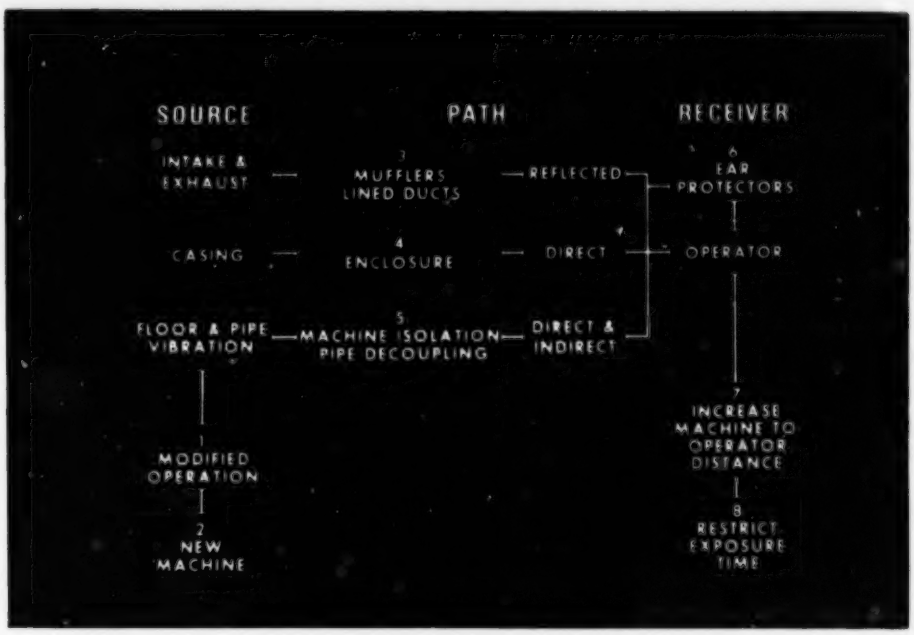
Figure 18 shows the solutions or possible solutions to the problem. The first correction is to modify the operation of the machine by, for example, changing its operating speed. In this case, you can't modify the operation of the air compressor. The second suggestion would be to purchase a new and perhaps quieter machine. Again, cost versus performance has to be considered. In this case, neither of these suggestions are acceptable.

We look now at the path. You can disturb the path by putting mufflers and lined ducts on the air intakes and exhausts. These are very well known approaches and they usually will do a very adequate job. You can put an enclosure around the casing; this means enclosing the entire air compressor, but the costs go up. Additionally you have problems in a lot of cases where you have heat build up so you will have to put in ventilation or you will have a fire hazard where you will have to install fire equipment. The enclosure is an adequate way of reducing noise but it brings in costs beyond the enclosure itself.

The third suggestion is machine isolation and pipe decoupling. These are not costly items. You can put spring isolators on the compressor to raise it off the floor and break the continuity between the machine and the floor which will change the energy pattern into the floor. All those suggestions will reduce the noise both directly and indirectly to the operator. If this still isn't enough, we can use ear protectors. Ear protectors do work; they give you an 8 to 10 dB reduction. I have found that in some plants there has been a very good response from the employees

about wearing them; in other plants we have a very difficult time getting employees to wear them. When the noise is severe, such as in our stamping operations, everyone wears ear protectors because the workers are aware they are going deaf. In other plants where noise is less of a problem, we have difficulty getting employees to wear ear protectors. It is not just on the company that the responsibility lies, it also lies on the employees to take an interest in their own hearing. When I go into the plants, I talk to the employees. I find some are wearing Walkmans to drown out the background noise and they probably have 90 to 95 dBA in their ears. It ruins their defence mechanism because they can't hear.

Figure 18



Another thing we can do is increase the distance of the operator from the machine; that means moving the operator away from the machine. This does work because every time you double the distance from the machine it registers as a 6 dB reduction. The more you move the operator back, the less noise level there is. This is a valid way of operating if the worker can be away from the machine.

The next thing is to administratively adjust the worker's time spent in a noisy area of the plant. S/he can work four hours on one machine and four hours in a quieter area. This generally isn't done; in fact, in most of our plants, people go from job to job moving all over the plant, so it is very difficult to measure each employee's true noise level.

We'll look at an acoustic design program. To institute one, you would assure that valid specifications are received on all new equipment, especially equipment that you know is going to be noisy. This is critical to try to get the equipment to come in at a low noise level. To do it after the fact is very costly; to do if before the fact is a lot less costly because the vendor is interested in reducing the noise level of the machine.

Then you evaluate the data of what the noise level of the equipment is going to be in the area where the machine will be installed. This can be done. As you get more and more equipment, you keep adding the noise levels so that you know what the total result will be in the area for the workers.

You then devise the most economical, effective abatement techniques.

Review and coordinate with the client or whoever is receiving the machine the recommended action and alternatives. Let him/her understand what has to be done to keep the noise at a low level.

The Acoustic Design Program includes the accepted attenuation procedures into the design drawings so that there is a record; later on, you can go back and see what was done.

It is very important to ascertain costs and delivery time of the devices. You have to get the material in to operate the plant. The equipment must be there at a certain time because the job has to get done by a certain date.

Maintain a file on acoustic data. Next, predict community noise levels of new plants. When we put in new additions or new plants, we go out and do a detailed survey of the area before. We find out what the plant layout will be and make recommendations on what should be done to maintain good relationships with the community.

Use the results of the program to assist equipment suppliers; and this is an important point. Provide this data to the equipment vendor and suggest how s/he may quiet his equipment.

And document each phase of this program for record purposes.

TRAINING

Lillian Vine

Pat Brogan is an Industrial Hygienist at Ford Motor Company. She is currently working on her Doctorate in Instructional Technology (which is training) at Wayne State University. She's pursuing this area of interest for a very practical reason--all the health standards being promulgated call for training. Two accomplishments of which she is very proud are her professional certification as an Industrial Hygienist by the American Board of Industrial Hygienists and her appointment to the Michigan Occupational Health Standards Commission by Governor Blanchard. The commission is to Michigan what the federal OSHA is to the US, because Michigan is a "state-plan" state, which means the commission promulgates occupational health regulations for Michigan.

Pat started her career in environmental health as a "stack sampler" at Clayton Environmental Consultants. She worked at Clayton three years before joining Ford. She has now been with Ford five years; her major responsibilities are providing technical and administrative industrial hygiene services to eleven Ford of Canada plants in Ontario and seeing to it that the Company's Hearing Conservation Program becomes more effective in North America.

To discuss training, I am pleased to call on Pat Brogan.

Pat Brogan - Ford Motor Company

The Michigan Occupational Health Standards Commission is to Michigan what OSHA is to the US. Since Michigan is a "state-plan" state, we develop our own standards. In Ontario much the same thing is done, with the federal government as an umbrella. I serve on the commission which sets the occupational health standards for Michigan.

I am happy to be here as a presenter discussing noise. When I discuss noise, the first thing that comes to my mind is a question that was once asked me by a hearing conservation specialist. Which of your senses would you rather lose--your sight or your hearing? Most of us would immediately say we'd give up our hearing to maintain our sight; but many people who have lost both senses indicate they would rather regain their hearing than their sight. Thinking about this increases my awareness of the importance of discussing losing hearing because of exposure to excessive noise.

I'm here as a trainer as well as an industrial hygienist. I will present to you a generic way of looking at training. Training is part of almost all standards that are promulgated now and will become a part of every standard in the future. There are as many training programs available as there are companies putting on training programs. My colleagues in Canada have as many training programs to handle their noise training as there are people dealing with them. That is good if it means that

they have looked at their training program in terms of their audience and have planned for that audience. As a trainer, I know that 60% of what you hear me say this morning you may remember right after I finish speaking, but two days from now you may remember 10%, probably much less. What I hope to do is give you some ideas about training that you can use in all your health and safety training, not just noise.

Specifically, in the proposed Ontario standard there are three areas where training is required. It is required to train employees in the health effects of noise; in the measures and procedures required when a hearing conservation program is in effect (when noise exposures are at or above 85 dBA); and in the proper fit, care and use of hearing protection equipment. The training and instruction should include supervisors and workers in activities such as lectures, audio-visual presentations or discussions prior to noise exposure and should be reviewed at least every two years.

I believe training is different than education. The present system in schools uses lectures as the means of magically transferring information from the teachers to the students. Trainers don't assume that this transfer of information is going to happen automatically. Trainers have looked carefully at how learners learn. In the 1950s the military started "training" people instead of "educating" because they needed 100% of the people to do a specific job correctly 100% of the time. When you get the result that you set out to get--that's training. Training is a very systematic approach to an instructional process that helps people learn and change what they think or how they behave. Training has always been an acceptable way to achieve your objectives in occupational health and safety.

Education, engineering, and enforcement are accepted methods of protecting employee health and safety. We've known for many years that when you tell an employee something about the conditions in which s/he's working, s/he will take on the responsibility of protecting himself/herself. If you give the facts in a straightforward manner and explain what is necessary, the employee will then carry on with the necessary duties. Although training has been an accepted and recognized tool for many years, training principles are often not followed.

There are five principles in the instructional process:

- Do a needs analysis and clarification. What do you need in your training? What are your objectives?
- Design the training so that it meets the needs of the audience or clientele that you have to train.
- Develop a program which makes it possible to transfer the needs that you have identified to training which improves the skills or behavior of the employee.
- Implement that program.
- Evaluate the program to determine if the instructional process actually has accomplished your goals.

The success of the instructional process depends heavily on front-end analysis or needs assessment and clarification. Before you try to initiate a training program, determine what you need. Determine if there is a discrepancy in the performance; for example, if an area is posted as a high noise area (greater than 90 dBA) and only 40% of the employees are using hearing protection, you must determine why this discrepancy exists.

Identify the cause of the discrepancy. Is there a discrepancy in a skill or knowledge--do they not know their hearing will be damaged? Perhaps it is as simple as telling them or convincing them that their hearing will be damaged. Is it practice? Did no one say anything to them? Does no one else wear it? When I am on the plant floor, I will remind employees of the importance of wearing hearing protection even where it is not mandatory for them to do so. Wearing Walkmans and playing radios is a particularly dangerous practice, because they usually add from 5 to 8 dBA to an employee's exposure. Is it teamwork or motivation? What is the reason the discrepancy exists?

Next you have to look at who has to be trained? Where are they? What are their education and reading levels? Are there language constraints? Are there cultural and sociological constraints? You are not going to be an effective trainer if you don't know who the people are and how you can reach them.

You must establish the objectives of the training--both the company objectives and the learner objectives. Objectives should be measured when you are finished training. Is the objective to develop in the employee an awareness that noise-induced hearing loss will affect his/her whole life, or do you have an organizational objective to lower compensation costs across the company? Everyone has different objectives and they should be clearly established before training.

You also have to consider the timing and legal constraints if you must comply with a standard. Compliance is another objective.

Next you develop your training agenda and prepare the employees. We will be distributing a letter and a booklet to our employees as we start our next noise measurement survey. This is to let them know ahead of time why we are coming into their plants. We are preparing them to think about what we are going to be doing when we are there. We expect many will have questions for us.

Training development includes the selection or creation of instructional materials. Take into consideration the resources that are commercially available. You must decide if you want to use booklets, video tapes, computer-assisted instruction, lectures, 5-minute talks, and/or posters. There are many different media available with which to do your training. Determine which materials you can effectively use from the needs analysis and the audience. The class size must be determined; the equipment must be selected and obtained.

During the pilot implementation stage final adjustments are made to the program. A formative evaluation is given; from the feedback the program can be adjusted and amended. You then implement the entire program.

The most important component of the instructional process is evaluation, formative for adjustment and summative for justification. You may not be asked to evaluate your program, but you should be ready to give a justification for what you've done. Evaluate your program based on the objectives which were set at the start. After testing, show that your goals were met. Determine if the program is cost effective. Evaluation also demonstrates regulatory compliance, provides feedback to improve the program and motivate the learners, and measures performance.

The instructional process is a systematic way of reconciling a performance discrepancy--getting from A to B systematically through an up-front analysis of your needs, setting out objectives, designing a program to meet those objectives, preparing a program that will effectively meet the needs of your audience, implementing your program in the best possible way, and then evaluating the program to determine if your goals were met.

I appreciate the opportunity the Centre has given me to share this information about training with you.

PLENARY REPORTS OF PROFESSIONALS, MANAGEMENT & LABOUR

RECOMMENDATIONS & DIRECTIONS FOR THE FUTURE

CCOHS/CCHST

Lillian Vine

This morning you met separately in groups of labour, management and professionals. At this plenary session, you will report the conclusions that your group reached from the mixed discussions you held yesterday. It has obviously been lively. I hope you've enjoyed the workshop and uncovered a great deal of common ground. Your reports will be published in the proceedings. We transcribe them, edit them, pass them on to the chairmen to make sure that the document which emerges is a true reflection of your discussions, your agreements, your doubts, the points of disagreement and the points you feel require more discussion.

There is something I found out last night that had not been made clear. I want you to know that the members of the panel at our workshops give of their time and expertise because they believe in the Centre; we don't pay any of their expenses. They do it because they believe that information that's understandable, that's current and that's trustworthy will help to develop safe and healthy workplaces. They believe that the common ground reached by open and thoughtful discussions in our workshops will lead to new understandings and to safe and healthy workplaces. We are extremely grateful. I want to very sincerely thank Don Smith and Pat Brogan of Ford; Normand Nault, who represents the Quebec Federation of Labour; and Raymond Hétu of the Université de Montreal.

Reporting for professionals is Jo Crosse, who chaired both the mixed group and the professionals group.

REPORT OF PROFESSIONALS

Jo Crosse - Sontex Health Services Ltd

This morning, I found that both groups, the professionals and the mixed group, were very close together in their feelings of the problem. It was difficult to decide what we addressed the most, so we took the workshops in order and commented on each.

Scope of Problem

Agreed that:
- Loss of hearing is the most common health problem in industry.
- It has not been dealt with adequately.
- The problem is more widespread than any of us realize.

Also, hearing tests themselves should be used only within the context of a general hearing conservation program and the test result considered medical confidential information.

Role of Audiometry

Agreed that:

- Test should be used as a screening tool only and form part of an overall plan for enhancing noise abatement procedures in the workplace.
- Test itself could be perceived as a violation of human rights by some employees.
- Tests were more likely to be useful to only the worker tested.
- Test is a snapshot in time only and may not define the problems or foresee problems.
- Test results may contain errors but do provide information to the company which will assist in establishing corrective measures.

There was no consensus reached as to whether hearing testing should be mandatory.

Job Design, Workplace Design and Preventive Measures

Agreed that:

- Engineering control, a hearing conservation program, enhanced administrative practices, and education and training were cited as the major foci and must include everyone from management to the workers.
- Personal protective equipment, such as hearing protection, must be used as a last resort only.
- Engineering controls should be the first line of defence.
- When purchasing equipment, the manufacturer should be meeting certain standards in regard to noise abatement.
- There must be 100% cooperation between groups within an industry; that is management, labour, and health and safety committees should be well represented so they can reach a consensus.
- No two companies have the same needs.
- For some companies, personal protective equipment, such as hearing protection, may provide overall and more cost effective protection, if the expertise is not available for engineering change.

If legislation is promoted, it should be realistic and enforceable.

REPORT OF MANAGEMENT

Raymond Clark - Consumers Gas

We agreed on the following six major points:

Noise should be not only a workplace concern, but also a lifestyle concern.

Education about industrial hygiene should be provided at a high school level.

Education and training should be conducted as a joint venture between management and labour.

When noise controls have been instituted, preventable maintenance is a must to ensure that they are effective.

Questions were raised concerning the validity of audiometric testing and we feel it should be pursued further.

We agree that instituted policies and procedures for the workplace have to be enforced for all workers as referenced by the Occupational Health and Safety Act.

REPORT OF LABOUR

Romeo LeBlanc - Motor Wheel Corporation

We agreed that hearing loss is one of the largest occupational illness problems that we face and we believe that it is just the tip of the iceberg. We see a problem with people who do not come forward and admit having a hearing disability. Many people try to mask their disability because of the way co-workers and society perceive them. They are embarrassed about this disability and this in turn creates emotional problems for them and their families. Society, because of its lack of knowledge, is not coping adequately with the problem.

Hearing tests will not predict the loss of hearing; however, we know through studies that workers who are exposed to high levels of noise over a period of time will suffer a hearing loss. Audiometric testing is supposed to be an exact science. But if the tests are not performed properly, the validity of the results is suspect. At best, the tests have an error factor of plus or minus 5 dB, according to Dr Hétu and other health professionals. Tests cannot minimize occupational deafness because they cannot predict who will be more susceptible to hearing loss.

A person showing hearing loss on a pre-selection test may not be hired because of fear by the company of a compensation claim in the future. Some companies may use this form of testing as a means of discriminating against people with a slight hearing disability.

Audiometry does not control noise or prevent hearing loss. It would be better to institute a hearing conservation program. We feel engineering capabilities are there and should be used to eliminate noise at the source. As Don Smith said, 90% of the noise can be taken care of at the source. If a company has a noise abatement program, the program may not be followed exactly and will therefore not be effective. The workers must be trained about noise control and hearing loss and this should include employees from top management to the worker on the floor.

There should be training in the school systems on all types of hazards in the workplace, not just noise. Students should be taught how to control and eliminate hazards. We agreed to ask the Centre to deliver our concern to school boards about the lack of occupational health and safety training in the schools. School children should be made aware of occupational health and safety problems long before they join the workforce.

Better laws with strict enforcement for noise control should cover all workplaces. Joint health and safety committees should have more power to recommend and participate in decision-making where noise is a concern.

We know that we can reduce noise levels in the workplace environment, but we need more efficient ways to achieve that goal. If we can send people to the moon, I am sure we can reduce noise in plants.

DISCUSSION

Lillian Vine

There are many points of agreement among the three groups; points of disagreement may emerge in discussion. Laws that are realistic, enforceable and enforced are seen as a high priority by all three groups. Jointness of training is also seen as vital. There is not confidence in testing as a means of solving the problem. The first line of defence must always be controlling noise at the source; that came out very clearly from all three groups.

The matter of training and education before young people enter the workplace is something which has been raised at several of our workshops. But we have never before been given a clear direction to act as just now. What I just heard was a request to the Centre to communicate to the bodies which decide curriculum the recommendation from this workshop. We will take that direction and we will get your message out.

Chuck Emberson - United Steelworkers of America

I would like to direct my question to Jo Crosse. The concern I have is with the role of audiometry and the test results being used by the company to put in controls and evaluate those controls. However, earlier in your presentation you said that the test results were private medical information. How can we use this private information so that companies can put in controls?

Jo Crosse

The easiest way to answer your concern is to explain how my company reports after doing testing. We give the employer a list of the employees who tested normal, the employees who had lost hearing from previous screening and the employees that we referred. This gives management some idea of what department or area of the company requires attention. We do not release the actual information on the tests without written permission from the individual. This is a general type of report that tries to pinpoint problem areas within the company.

Chuck Emberson

Even on a general report to an employer, you show which individual employees have lost hearing, which have remained the same and which have lost a lot of hearing. To me, this sounds as though you have given away confidential information.

Jo Crosse

If you think of it in the context of engineering control, this is not specific medical information. The message I got from this workshop is that we want management to take a pro-active role in noise abatement; management can't do that without information. Each result the company gets from a sound level survey or personal testing or widespread screening gives it some information to work with. We always discuss our procedures with the employees we test. Each employee receives a personal letter informing him/her what we have done and what our advice is. I'd like to think we've acted responsibly for both the worker and management.

Chuck Emberson

I think there may be some problems with that. We talked about audiometry and we felt it wasn't going to prevent hearing loss; it wasn't going to help control the problem. In the sense of a complete hearing conservation program, there might be some use for audiometry. But we felt the workplace would have to be evaluated and a complete noise survey would have to be carried out to determine the noise sources so

that controls could be instituted. I don't feel that we need audiometry until after the fact. I feel it would be cheaper for the company to do dosimetric testing and mapping of the workplace on a periodic basis to get a better understanding of whether the controls are working.

We agreed that we are not going to be able to control all sources of noise in the workplace. If we cannot control the source of the noise, we must make sure that somehow we protect the worker. Audiometry should only be used to see if workers are losing hearing. We should be concerned with finding the noise sources and eliminating them, not conducting hearing tests on the workers, because we cannot control noise through their ears.

Jo Crosse

I agree. Audiometry is just a small part of the overall plan.

Chuck Emberson

It is a part that should come late in the plan; after controls, training and education have been tried. Once we have reached the point when we cannot control all sources of noise, then I can see the need for audiometry to evaluate the worker on a periodic basis to find out if there is hearing loss. We can then try to help prevent more hearing loss by more efficient protective measures. Audiometry is not the answer to controlling noise or eliminating the source; that has to be done through evaluation of the workplace.

Lillian Vine

Two points were raised repeatedly in the workshops. One was that noise was not only a workplace concern but it went beyond the workplace. The other point dealt with the perception of deafness. These two points hang together; they are social aspects that tie into the need for education. Deafness is the unseen handicap, which leads people to hide it, which then leads to lack of controls. Noise isn't something that just happens in the workplace; you are subjected to noise outside the workplace as well. Awareness of noise involves education and developing an understanding of and a sensitivity to the problem and trying to control it.

I would like to thank the work group leaders and rapporteurs--Jo Crosse, Romeo LeBlanc, Don Smith, who chaired the management group and Ray Clark, who reported for management. And I want to thank all of you, the participants, for coming and participating. The agreements that you reached here will have an effect far beyond this room. As the proceedings are printed and distributed and used, you will find that many others become party to these agreements.

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